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(Reaffirmed 2004)

DIMENSIONS OF INDOOR AND OUTDOOR PORCELAIN POST INSULATORS AND POST INSULATOR UNITS FOR SYSTEMS WITH NOMINAL VOLTAGE GREATER THAN 1000 V

PART II OUTDOOR CYLINDRICAL POST INSULATORS

(First Revision)

Third Reprint SEPTEMBER 1993

UDC 621.315.623:389.63

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr4 August 1974

Indian Standard

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PART II OUTDOOR CYLINDRICAL POST INSULATORS

(*First Revision*)

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DIMENSIONS OF INDOOR AND OUTDOOR PORCELAIN POST INSULATORS AND POST INSULATOR UNITS FOR SYSTEMS WITH NOMINAL VOLTAGE GREATER THAN 1000 V

PART II OUTDOOR CYLINDRICAL POST INSULATORS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part II) (First Revision) was adopted by the Indian Standards Institution on 12 November 1973, after the draft finalized by the Electrical Insulators and Accessories Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard is intended to establish standard values of those electrical characteristics, mechanical characteristics and dimensions that are essential to the interchangeability of post insulators and post insulator units.

NOTE - General definitions and methods of tests of post insulators are covered by IS : 2544-1973*.

0.3 This standard covers three types of post insulators in the following three parts :

Part I Indoor post insulators
Part II Outdoor cylindrical post insulators (the term cylindrical insulators is intended to cover also insulators of the truncated conical form)
Part III Outdoor pedestal post insulators

0.3.1 The three types of insulators are distinguished by their electrical, mechanical and dimensional characteristics. Figure 1 illustrates typical example of outdoor cylindrical type of insulator. This drawing is only general illustration and other shapes and constructions are permitted.

0.4 This part of the standard was first issued in 1969. This revision has

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*Specification for porcelain post insulators for systems with nominal voltages greater than 1 000 v (first *revision*).

been undertaken to incorporate the values of mechanical strength of cylindrical post insulators in tension and compression in Table 1.

0.4.1 The opportunity is also utilized to cover the guide to selection of outdoor cylindrical post insulator in Appendix A.

0.5 In the preparation of this standard, assistance has been derived from IEC Publication 273 (1968) 'Dimensions of indoor and outdoor post insulators and post insulator units for systems with nominal voltages greater than 1 000 V', issued by the International Electrotechnical Commission.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part II) applies to cylindrical post insulator and post insulator units of ceramic material intended for outdoor service in electrical installations or. equipment operating on alternating current with a rated voltage greater than 1 000 V and a frequency not greater than 100 Hz. The insulators covered by this standard are primarily intended for use in isolators (disconnectors) or as bus bar or fuse supports.

2. ELECTRICAL CHARACTERISTICS

2.1 Each post insulator is designed to meet a specified impulse withstand voltage in accordance with IS : 2544-1973†. The corresponding power frequency withstand voltage is also given. The system voltage is not specified because, depending on service conditions, it may be necessary to choose different insulators for a given system voltage.

3. MECHANICAL CHARACTERISTICS

3.1 Post insulators are standardized in mechanical strength classes based on values of the specified failing load in the bending test, chosen to conform as far as possible with current practice. Unless otherwise agreed, it is assumed that a post insulator is to be mounted in the upright position, that is, with the live end at the top. It is also assumed that the load is applied at the top surface. Where insulators are to be mounted underhung, the standard values of bending strength may not be applicable. Other positions of mounting (for example, horizontal) may also affect the strength if the weight of the post insulator is not negligible. The appropriate strength rating for methods

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*Rules for rounding off numerical values (revised).

†Specification for porcelain post insulators for systems with nominal voltages greater than 1 000 V (*first revision*).

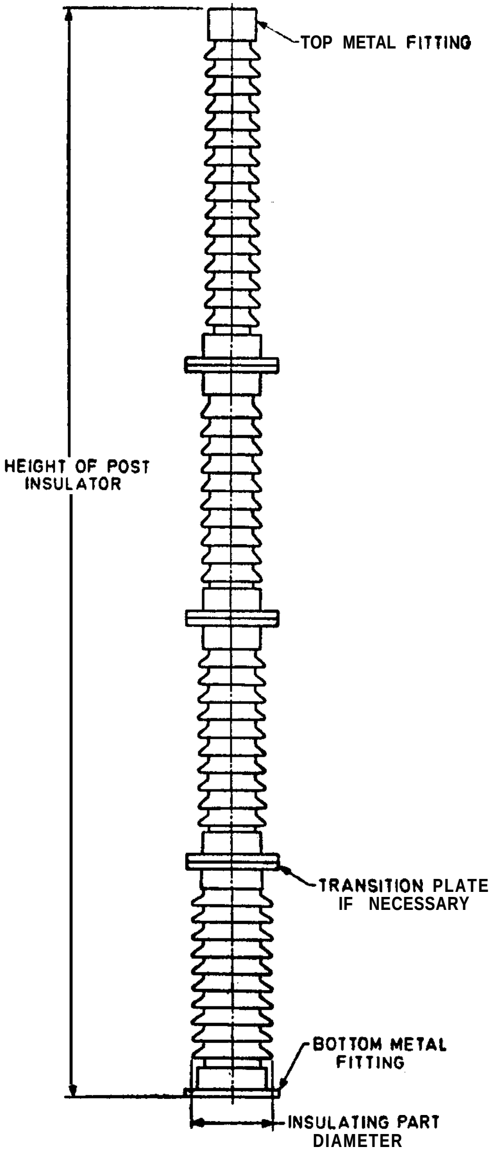

FIG. 1 EXAMPLE OF A FOUR-UNIT CYLINDRICAL POST INSULATOR

of mounting other than upright shall be subject to agreement between the manufacturer and the purchaser.

3.2 The mechanical strength classes for outdoor cylindrical post- insulators are as follows :

Strength	Class	2	2 000 N
,,	,,	4	4 000 N
,,	,,	6	6 000 N
,,	,,	8	8 000 N
,,	,,	10	10 000 N

3.3 Mechanical strength in tension, compression and torsion are also given in Table 1. However, tension and compression values are for general guidance where these are important for special applications. A failing load *Px* may also be specified and will refer to a load applied at x mm above the top face of the insulator. The value of such loads shall be subject to agreement between the purchaser and the manufacturer.

4. DIMENSIONAL CHARACTERISTICS

4.1 The following dimensional characteristics are specified :

a) Overall height,

b) Maximum diameter of the insulating part,

c) Fixing arrangements (see **6**), and

d) Minimum creepage distance.

4.2 The overall heights of post insulators specified in Table I have been chosen to permit the insulators to comply with the specified electrical characteristics when tested in accordance with IS : 2544-1973*.

4.2.1 Where the arrangement of the insulators in service differs appreciably from the standard arrangement for test, the electrical characteristics under service conditions may be different. Exceptional cases may require special precautions or even the choice of a larger insulator.

4.3 The nominal dimensions of an insulator shall not be greater than the specified maximum or less than the specified minimum values. Actual dimensions of insulators are subject to manufacturing tolerances.

4.4 The minimum creepage distances specified are intended to cover the use of post insulators under normal or slightly polluted conditions. The amount by which the creepage distance of the insulator may be increased within the specified dimensions varies according to the design and size of the insulator,. and where increased creepage distance is required, it should be the subject of agreement between the manufacturer and the purchaser in order to avoid designs which are unsuitable for service in polluted atmosphere.

***Specification for porcelain post insulators for systems with nominal voltages greater than 1 000 V (first *revision*).**

5. REQUIREMENTS

5.1 The specified characteristics of cylindrical post insulators are given in the following tables :

a) Electrical, mechanical and dimensional characteristics — see Table 1, and
b) Fixing arrangements-see Table 2.

5.1.1 In Table I, all insulators of the same impulse voltage rating are grouped together.

5.2 The basis of standardization of cylindrical post insulators is the full specification of the complete post insulator.

5.2.1 Cylindrical post insulators C2-60 to ClO-550 generally consist of only one unit.

5.2.2 Cylindrical post insulators C2-650 to ClO-1550 generally consist of one or more units.

5.2.3 To reduce the number of standard units, some ratings have been covered by the use of post insulators of higher ratings. Guidance to the selection of insulators in such cases is given in Appendix A.

6. NIXING ARRANGEMENTS

6.1 The fixing arrangements of standard cylindrical post insulators sha!! be in accordance with Table 2.

6.2 Fixing holes shall be equally spaced on the appropriate pitch circle, which shall be concentric with the axis of the insulator. Holes in top and bottom fittings shall be in line, unless otherwise specified, and they shall be so arranged as to permit the use of normal hexagon head bolts and nuts.

6.3 The tapped holes shall be of standard size except that the diameter may be oversize by not more than 0·25 mm. They shall be suitable for steel bolts having standard dimensions after galvanizing. The length of full thread shall be not less than the nominal bolt diameter. The threads of tapped holes in galvanized fittings shall be cut after galvanizing.

6.4 Standard insulators shall have IS0 metric threads conforming to IS : 4218-1967*. To assist interchangeability fixing bolts may be supplied with each post insulator if specified by the purchaser when ordering.

7. DESIGNATION OF POST INSULATORS

7.1 Each standard post insulator is assigned a reference symbol which indicates the type of insulator. The symbol for outdoor cylindrical post insulator is **'C'**.

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*ISO metric screw threads.

TABLE 1 CYLINDRICAL POST INSULATORS

[*Clauses* 3.3, 4.2, 5.1(a) *and* 5.1.1]

POST INSULATOR DESIGNATION	IMPULSE WITHSTAND VOLTAGE	POWER FREQUENCY WITHSTAND VOLTAGE WET	CREEPAGE DISTANCE *Min*	FAILING LOAD (*Min*)				HEIGHT OF INSULATOR	INSULATING PART DIA *Max* (*see* Note 2)	TOP METAL FITTING PITCH CIRCLE DIA (see Note 3)	BOTTOM METAL FITTING PITCH CIRCLE DIA (see Note 4)
				Bending (*see* Note 1)	Torsion	Tension	Compression				
(1)	(2) kV	(3) kV	(4) mm	(5) N	(6) Nm	(7) N	(8) N	(9) mm	(10) mm	(11) mm	(12) mm
C2-60	60	27	130	2 000	400	8000	16000	190±1	130	76	76
C4-60	60	27	130	4 000	600	12 000	24 000	19011	145	76	76
C6-60	60	27	130	6 000	600	16 000	32 000	19011	150	76	76
C8-60	60	27	130	8 000	800	20 000	40 000	190±1	155	76	76
C10-60	60	27	130	10000	1000	25000	50000	190±1	160	76	76
C2-75	75	35	230	2 000	400	10 000	20 000	215±1	135	76	76
C4-75	75	35	230	4 000	600	14 000	28 000	215±1	150	76	76
C6-75	75	35	230	6 000	600	20 000	40 000	215±1	155	76	76
C8-75	75	35	230	8 000	800	25 000	50 000	215±1	165	76	76
C10-75	75	35	230	10000	1000	27500	55000	215±1	170	76	76
C2-125	125	55	380	2 000	500	12 500	25 000	305±1	140	76	76
C4-125	125	55	380	4 000	800	20 000	40 000	305±1	155	76	76
C6-125	125	55	380	6 000	800	25 000	50 000	305±1	165	76	76
C8-125	125	55	380	8 000	1 200	30 000	60 000	305±1	175	76	76
C10-125	125	55	380	10000	1200	35 000	70 000	305±1	180	76	76

C2-170	170	75	580	2000	800	16000	32000	**445±1**	145	76	76
C4-170	170	75	580	4 000	1200	25000	50000	**445±1**	160	76	76
C6-170	170	75	580	6 000	1 500	30 000	60 000	**445±1**	170	76	76
C8- 170	170	75	580	8000	2000	40000	80000	**445±1**	180	76	76
C10-170	170	75	580	10 000	2 500	43 000	86 000	**445±1**	190	76	76
C2-325	325	140	1 100	2 000	1200	25000	50000	**770±1**	155	127	127
C4-325	325	140	1 100	4000	2 000	35000	70000	**770±1**	195	127	127
C6-325	325	140	1100	6 000	2 500	40000	80000	**770±1**	210	127	127
C8-325	325	140	1100	8000	3000	50000	100000	**770±1**	220	127	127
C10-325	325	140	1100	10 000	4000	60000	120000	**770±1**	230	127	127
C2-450	450	185	1600	2000	1 800	30000	60000	**1 020±1**	165	127	127
C4-450	450	185	1600	4000	2 500	45000	90000	**1 020±1**	205	127	127 or 178 or 225
C6-450	450	185	1600	6000	3 500	60000	120000	**1 020±1**	220	127	127 or 178 or 225
C8-450	450	185	1600	8000	4 000	70000	140000	**1 020±1**	230	127	127 or 178 or 225
C10-450	450	185	1600	10 000	4000	90000	180000	**1 020±1**	240	127	127 or 178 or 225
C2-550	550	230	1 850	2000	2 000	35000	70000	**1 220±1**	170	127	127
C4-550	550	230	1 850	4 000	3 000	50000	100000	**1 220±1**	210	127	127 or 178 or 225

(*Continued*)

TABLE 1 CYLINDRICAL POST INSULATORS —*Contd*

POST INSULATOR DESIGNATION	IMPULSE WITHSTAND VOLTAGE	POWER FREQUENCY WITHSTAND VOLTAGE WET	CREEPAGE DISTANCE *Min*	FAILING LOAD (*Min*)				HEIGHT OF INSULATOR	INSULATING PART DIA *Max* (see Note 2)	TOP METAL FITTING PITCH CIRCLE DIA (*see* Note 3)	BOTTOM METAL FITTING PITCH CIRCLE DIA (*see* Note 4)
				Bending (*see* Note 1)	Torsion	Tension	Compression				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	kV	kV	mm	N	Nm	N	N	mm	mm	mm	mm
C6-550	550	230	1 850	6000	4000	60 000	120 000	1 220±1	225	127	127 or 178 or 225
C8-550	550	230	1 850	8000	4000	80000	160000	1 220±1	240	127	127. or 178 or 225
C10-550	550	230	1 850	10000	4000	95 000	190000	1 220±1	250	127	127 or 178 or 225
C2-650	650	275	2 250	2 000	2 000	40 000	80 000	1 500±2·5	250	127	127 or 178 or 225
C4-650	650	275	2 250	4 000	3 000	60 000	120 000	1 500±2·5	270	127 or 178 or 225	178 or 225
C6-650	650	275	2 250	6000	3000	70 000	140 000	1 500±2·5	280	127 or 178 or 225	178 or 225

C8-650	650	275	2 250	8000	4000	95 000	190000	1 500±2·5	330	127 or 178 or 225	225 or 254
C10-650	650	275	2 250	10 000	4 000	110 000	220 000	1 500±2·5	330	127 or 178 or 225	225 or 254
C4-900	900	393	3 400	4 000	3 000	70 000	140000	2 100±3·5	280	127 or 178 or 225	178 or 225
C6-900	900	395	3 400	6000	3000	100000	200000	2 100±3·5	300	127 or 178 or 225	225 or 254
C8-900	900	395	3400	8000	4000	120 000	240 000	2 100±3·5	330	127 or 178 or 225	225 or 254 or 275
C4-1050	1 050	460	3 800	4000	3 000	80 000	160 000	2 3OOf3.5	300	127 or 178 or 225	178 or 225
C6-1050	1 050	460	3 800	6000	3000	110 000	220 000	2 300±3·5	300	127 or 178 or 225	254
C8-1050	1 050	460	3800	8000	4000	130 000	260 000	2 300±3·5	350	127 or 178 or 225	275
C10-1050	1 050	460	3800	10 000	4000	160 000	320 000	2 300±3·5	350	127 or 178 or 225	300
C4-1550	1 550	680	6 480	4000	3000	100 000	200 000	3 350±4·5	300	127 or 178 or 225	254

(Continued)

TABLE 1 CYLINDRICAL POST INSULATORS — *Contd*

Post Insulator Designation	Impulse Withstand Voltage	Power Frequency Withstand Voltage Wet	Creepage Distance *Min*	Failing Load (*Min*)				Height of Insulator	Insulating Part Dia *Max* (*see* Note 2)	Top Metal Fitting Pitch Circle Dia (*see* Note 3)	Bottom Metal Fitting Pitch Circle Dia (*see* Note 4)
				Bending (*see* Note 1)	Torsion	Tension	Compression				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	kV	kV	mm	N	Nm	N	N	mm	mm	mm	mm
C6-1550	1 550	680	6 480	6 000	3 000	145 000	290 000	3 350±4·5	350	127 or 178 or 225	300
C8-1550	1 550	680	6 480	8 000	4 000	160 000	320 000	3 350±4·5	370	127 or 178 or 225	325
C10-1550	1 550	680	6 480	10 000	4 000	180 000	360 000	3 350±4·5	420	127 or 178 or 225	356

NOTE 1 — For the post insulators C2-60 to C10-550, the bending strength when mounted underhung shall be at least 50 percent of the strength specified in this table. For post insulators C2-650 to C10-1550, the bending strength when mounted underhung shall be subject to agreement between manufacturer and purchaser (*see* also 3).

NOTE 2 — By agreement between manufacturer and purchaser, larger maximum diameters of the insulating parts may be permitted, for example, where the insulators are intended for use in severe pollution.

NOTE 3 — By agreement between manufacturer and purchaser, the top metal fitting of post insulator C2-60 to C10-170 may have a tapped centre hole M12. For further details of fixing arrangements, *see* 6. By agreement between manufacturer and purchaser, fixing arrangements different from those in col 11 and 12 may be used. In such cases, the fixing arrangement shall be chosen from Table 2.

NOTE 4 — Wherever necessary, suitable sub-base of 89 mm height may be used for mounting stacks to provide full arcing distance.

TABLE 2 STANDARD FIXING ARRANGEMENTS OF OUTDOOR CYLINDRICAL POST INSULATORS

[*Clauses* 5.1 (b) *and* 6.1]

PITCH CIRCLE	NO. OF BOLTS	BOLT HOLES		NOMINAL DIA OF MOUNTING FACE, NOT TO EXCEED
		Tapped		
(1)	(2)	(3)	(4)	(5)
mm		mm	mm	mm
76	4	12	—	115
127	4	16	—	165
178	4	—	18	225
200	4	—	18	245
225	4		18	270
254	8	—	18	300
275	8	—	18	320
300	8	—	18	345
325	8	—	18	370
356	8	—	18	400
375	8	—	18	420

7.2 Strength Class — The outdoor cylindrical post insulators are classified into the following strength classes :

2, 4, 6, 8, 10

7.2.1 The mechanical strength for these classes has been specified in 3.2

7.3 **Impulse Withstand Voltage** — The impulse withstand voltage values for outdoor cylindrical post insulators are as follows :

45, 60, 75, 125, 170, 325, 450, 550, 650, 900, 1 050 and 1 550 kV (peak)

Example :

A post insulator type C6-1050 indicates an outdoor cylindrical post insulator of strength class 6 and with impulse withstand voltage 1 050 kV.

NOTE — The designation does not always fully specify the insulator as sometimes alternative constructions are included in the standard, for example, the outdoor cylindrical post insulators may have alternative top metal fittings.

APPENDIX A

(*Clauses* **0.4.1** *and* **5.2.3**)

GUIDE TO THE SELECTION AND COMPOSITION OF OUTDOOR CYLINDRICAL POST INSULATORS

REQUIRED WITHSTAND VOLTAGES		REQUIRED STRENGTH CLASS				
Impulse (1) kV	Power Frequency (Wet) (2) kV	Class 2 2 000 N (3)	Class 4 4 000 N (4)	Class 6 6 000 N (5)	Class 8 8 000 N (6)	Class 10 10 000 N (7)
45	21	C2-60	C4-60	C6-60	C8-60	C10-60
60	27	C2-60	C4-60	C6-60	C8-60	C10-60
75	35	C2-75	C4-75	C6-75	C8-75	C10-75
125	55	C2-125	C4-125	C6-125	C8-125	C10-125
170	75	C2-170	C4-170	C6-170	C8-170	C10-170
325	140	C2-325	C4-325	C6-325	C8-325	C10-325
450	185	C2-450	C4-450	C6-450	C8-450	C10-450
550	230	C2-550	C4-550	C6-550	C8-550	C10-550
650	275	C2-650	C4-650	C6-650	C8-650	C10-650
900	395	C4-900	C4-900	C6-900	C8-900	C10-900
1050	460	C4-1050	C4-1050	C6-1050	C8-1050	C10-1050
1 550	680	C4-1550	C4-1550	C6-1550	C8-1550	C10-1550

NOTE — Characteristics of the outdoor cylindrical post insulators are given in Table 1.

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Savitri Complex, 116 G. T. Road, GHAZIABAD 201001	8-71 19 96
53/5 Ward No. 29, R.G. Barua Road, 5th By-lane, GUWAHATI 781003	3 31 77
5-8-56C L. N. Gupta Marg, (Nampally Station' Road) HYDERABAD 500001	23 10 83
R14 Yudhister Marg, C Scheme, JAIPUR 302005	6 34 71
117/418 B Sarvodaya Nagar, KANPUR 208005	21 68 76
Plot No. A-9, House No. 561/63, Sindhu Nagar, Kanpur Roaa. LUCKNOW 226005	5 55 07
Patliputra Industrial Estate, PATNA 800013	6 23 05
District Industries Centre Complex, Bagh-e-Ali Maidan. SRINAGAR 190011	—
T. C. No. 14/1421, University P. O.. Palayam. THIRUVANANTHAPURAM 695034	6 21 04

Inspection Offices (With Sale Point) :	
Pushpanjali. First Floor, 205-A West High Court Road. Shankar Nagar Square, NAGPUR 449010	52 51 71
Institution of Engineers (India) Building, 1332 Shivaji Nagar. PUNE 411005	5 24 35

•Sales Office Calcutta is at 5 Chowringhee 'Approach, P. O. Princep Street, CALCUTTA	27 68 00
† Sales Office is at Novelty Chambers; Grant Road, BOMBAY	89 65 28
‡ Sales Office is at Unity Building, Narasimharaja Square, BANGALORE	22 39 71

Reprography Unit, BIS, New Delhi, India